

### **REMARKS**

Applicants request reconsideration of the subject application based on the instant amendments and following remarks.

#### **Interview Requested**

Prior to the issuance of any new Office Action rejecting the instant claim(s), Applicants respectfully request that the Examiner grant an interview for the purpose of clarifying any remaining issues.

#### **Status of the Claims**

No claims are amended herein. Claims 1 - 18 are pending in the application.

#### **Status of the Application**

All claims of the application presently stand finally rejected pursuant to an Office Action dated July 10, 2006. This Office Action, which was a first office action after a Request for Continued Examination (RCE), made the rejection final. Applicants respectfully contend that the finality of the rejection is improper.

MPEP 706.07(b) provides that a first Office Action after an RCE may be made final if all claims "could have been finally rejected on the grounds and art of record in the next Office Action" if the claims had been entered before the RCE. However, in the Office Action of July 10, 2006, the Examiner raised a ground of rejection never previously raised, to wit, a rejection for alleged lack of written description pursuant to 35 U.S.C. §112, first paragraph. Because this ground of rejection had never been raised previously, a rejection based on this ground cannot be made final in a first Office Action after an RCE.

Applicants request that the finality of the pending Office Action be withdrawn, and that the claims be examined as if the pending Office Action had been non-final.

### The Invention

The presently-claimed invention is directed to flame retardant resin compositions comprising a thermoplastic polyamide resin, a phosphazene compound, and a phosphazene compatibility enhancing resin or anti-bleed-out resin consisting essentially of a polyphenylene ether-based resin, or a mixture of a polyphenylene ether-based resin and a polystyrene based resin. According to the claimed invention, the phosphazene compatibility enhancing resin or anti-bleed-out resin (B) is present in an amount sufficient to prevent bleed-out of the phosphazene compound from the resin composition.

Previously-known flame retardant resins suffer from problems such as corrosion of molding machines due to the flame retarder component, bleed-out of the flame retarder, and mold deposits. The present invention provides flame retardant resin compositions having excellent flame retardancy, mechanical properties, and heat resistance.

While fire-retardant polyamide resins containing a phosphazene compound have been described previously, as described above and in the subject specification, polyamide resin can suffer "bleed-out" of a phosphazene flame retardant due to poor compatibility of the phosphazene additive with the polyamide. It has been discovered by the present inventors that the addition of certain amounts of a polyphenylene ether-based resin (PPE) or polystyrene ether-based resin (PS) (or a mixture of PPE and PS) to the polyamide resin can improve the compatibility of the polyamide resin component and the phosphazene component, thereby reducing or prevent the bleed-out of the flame retarder in the polyamide resin composition and the attendant problems such as corrosion of molding machines, bleed-out of the flame retarder, and mold deposits. The compositions of the invention therefore represent an improvement over the prior art compositions.

## **The Office Action**

### **Claims Rejections – 35 U.S.C. §112, first paragraph**

In the Office Action, claims 1-18 were rejected as failing to comply with the written description requirement for reciting the language "to prevent bleed-out of the phosphazene compound. This rejection is traversed.

The present invention provides resin compositions in which the problem of "bleed-out" of a phosphazene flame retardant due to poor compatibility of the phosphazene additive with the polyamide is reduced. At page 14, lines 18-20, the present specification states that addition of a phosphazene compatibility enhancing resin or anti-bleed-out resin can "prevent the occurrence of sticky surfaces of pellets or molded products due to bleed-out of the phosphazene compound." Clearly, this result is achieved by preventing bleed-out of the phosphazene compound. As further stated at page 18, lines 11-13, a resin of the invention "is inhibited from suffering from bleed-out of the phosphazene compound as a flame retarder." Applicants respectfully contend that the specification provides ample support for the language "the phosphazene compatibility enhancing resin (B) is present in an amount sufficient to prevent bleed-out of the phosphazene compound."

Reconsideration and withdrawal of the rejection is proper and the same is requested.

### **Claims Rejections – 35 U.S.C. §103(a)**

In the Office Action, claims 1-15 and 17-18 were rejected under 35 U.S.C. §103(a) as unpatentable over Nakacho *et al.*, EP 0945478 ("Nakacho") in view of Ida *et al.* (US 6,337,031) or An *et al.* (US 5,028,347). This rejection is traversed.

The Examiner has cited Nakacho as disclosing resin compositions that may comprise a flame retardant, a thermoplastic resin, and a modified polyphenylene ether (with or without a polystyrene resin). The Examiner further stated that

[t]he employment of a polyamide, modified polyphenylene ether, styrene resin and modified styrene resins in combination is shown at page 10 paragraphs [0075] and [0076] . . . At page 4, the reference teaches the compositional limitations to comprise (a) 100 parts by wt of resin, (b) 0.1 to

100 parts by wt of a flame retardant, and (c) 0.1 to 50 parts by wt of organic phosphorus compound.  
Office Action at pages 3-4.

These statements are traversed.

As the reference is understood, Nakacho discloses flame retardants and flame retardant resins comprising a thermoplastic resin and a crosslinked phenoxyphosphazene compound. The phenoxyphosphazene compound can be selected from a group of cyclic phosphazenes or straight-chain phosphazenes. A lengthy list of possible thermoplastic resins is recited by Nakacho at page 10, paragraph 75, with paragraph 76 having a list of thermoplastic resins: "polyester, ABS resin, polycarbonate, modified polyphenylene ether, polyamide, **etc.** are preferably used." (emphasis added).

Paragraph 77 of Nakacho mentions briefly that "thermoplastic resins may be used singly or in combination," but no specific combinations are mentioned. Applicants note that the number of potential combinations of resins recited by Nakacho is very large; there are many potential combinations even if only the preferred resins of Nakacho are considered. In particular, no specific combinations of a polyamide resin with another resin are mentioned, much less a combination of a polyamide resin with a polyphenylene ether-based resin or a mixture of a polyphenylene ether-based resin and a polystyrene based resin, as presently claimed. There is also no teaching whatsoever of the amount of each resin to use in any combination; in contrast, the pending claims require a recited amount of the phosphazene compatibility enhancing resin.

Nakacho therefore cannot be seen as a specific teaching of the claimed compositions; at most, Nakacho discloses that polyamide can be used as a resin in combination with many other resins; however, there is no teaching or suggestion of the presently-claimed combinations of polyamide resin, anti-bleedout resin or phosphazene compatibility enhancing resin, and flame retardant, wherein the phosphazene compatibility enhancing resin or anti-bleed-out resin (B) is present in an amount sufficient to prevent bleed-out of the phosphazene compound from the resin composition. Of course, Nakacho does not acknowledge that bleed-out of a

phosphazene flame retardant from a polyamide resin can be a problem, so it is not surprising that Nakacho does not teach or suggest a solution to this problem.

Although Nakacho mentions polyamide as one resin, Applicants note that compositions including polyamide resins are not exemplified through working examples in the Nakacho reference. Despite the Examiner's assertion quoted above, the composition generally described at paragraph 26 of Nakacho, while it generally describes amounts of flame retardants that may be present, does not teach or suggest the *specific combinations* of materials required by the pending claims, nor are the claimed *amounts* of resins disclosed in Nakacho. Nakacho simply contains no teaching or suggestion of a phosphazene compatibility enhancing resin or anti-bleed-out resin (B) present in an amount sufficient to prevent bleed-out of the phosphazene compound from the resin composition.

Contrary to the Examiner's assertion quoted above, the Nakacho reference at paragraphs 75-76 does not teach or suggest "polyamide, modified polyphenylene ether, styrene resin and modified styrene resins in combination." As already discussed, the Nakacho reference mentions a list of resins that can be employed, and, at paragraph 77, at most, mentions in passing that combinations of thermoplastic resins can be used. However, the cited portions of Nakacho simply do not teach or suggest the specific combinations and amounts of components according to the invention defined by the present claims.

Applicants therefore submit that Nakacho provides no teaching or suggestion of a composition according to the presently-pending claims. In particular, Nakacho does not teach or suggest a flame-retardant resin having the *specific combinations* of materials required by the pending claims, nor are the claimed *amounts* of resins disclosed in Nakacho.

As described above, the Examiner points to the Nakacho reference as teaching the "[c]ompositional limitations to comprise (a) 100 parts by wt of resin, (b) 0.1 to 100 parts by wt of a flame retardant, and (c) 0.1 to 50 parts by wt of organic phosphorus compound." Applicants respectfully submit that this portion of the Nakacho reference does not teach or suggest all elements of the claimed invention.

Paragraph 26 of Nakacho (at page 4, lines 6-13) describes certain resin compositions denominated (a), (b), (c), and (d), each including a thermoplastic or thermosetting resin (100 parts by weight) and “flame retardant A” (0.1 to 100 parts by weight for resins (a), (b), and (d); 0.1 to 50 parts by weight for resin (c)). “Flame retardant A” of Nakacho is described at paragraph 24 of Nakacho (page 3, lines 53-54) as “a flame retardant comprising said crosslinked phenoxyphosphazene compound.” Composition (c), which the Examiner appears to be citing above, additionally includes “0.1 to 50 parts by weight of an organic phosphorus compound free of halogen.” Nakacho further teaches (e.g., at page 2, lines 29-33) that organic phosphorus compounds are useful as flame retardants.

Thus, the resins described at paragraph 26 of Nakacho include a thermoplastic or thermosetting resin and a phenoxyphosphazene flame retardant, optionally further including materials such as inorganic fillers or additional flame retardants. None of these compositions, including composition (c) of Nakacho, includes a phosphazene compatibility enhancing resin (or anti-bleed-out resin) consisting essentially of a polyphenylene ether (PPE)-based resin, or a mixture of PPE resin and a polystyrene (PS)- based resin, in the amounts required by the pending claims.

The Nakacho reference contains no teaching or suggestion of a composition including a phosphazene compatibility enhancing resin (or anti-bleed-out resin) consisting essentially of a PPE-based resin, or a mixture of a PPE-based resin and a PS-based resin, in specific amounts, as required by the pending claims. As discussed above, the Nakacho reference does not provide any teaching or suggestion that polyamide resins can suffer from poor compatibility with phosphazene flame retardants. It is also clear that the Nakacho reference also does not teach or suggest a solution to the issue of poor compatibility, such as the presently-claimed use of a phosphazene compatibility enhancing resin or anti-bleed-out resin in *specified amounts* relative to the amount of the phosphazene compound. Thus, the Nakacho reference cannot and does not provide any motivation to the skilled artisan to select the presently-claimed components, in the claimed amounts. In the absence of such motivation, the rejection of the present claims cannot stand. The Nakacho reference does not render obvious the claimed invention.

In the Office Action, the Examiner states that "Applicants argue the merits of the rejection based upon 35 USC 102 while the rejection was made under 35 USC 103." Applicants disagree. As discussed previously and in this Response, the rejection under 35 USC 103 over Nakacho (or any of the other cited references, whether taken alone or in combination) cannot stand.

In the Office Action, the Examiner further states that "applicants attempt to proffer patentability over Nakacho et al by asserting that they include other constituents, therefore outside the scope of the instant claims. It is pointed out that the instant claims recite 'comprising . . .'" Office Action at page 6. Applicants disagree; the Examiner has mischaracterized Applicants' argument. Applicants' point is that the cited portion of the Nakacho reference recites certain components which are not relevant to the patentability of the present claims, while failing to disclose all the elements of the present claims.

In the Advisory Action dated March 30, 2006, the Examiner stated that "[s]ince nothing is recited in the claims with regard to the 'poor compatibility' the manipulation of the constituents would have been within the skill of an artisan." This statement is traversed. As discussed above, Nakacho does not does not provide any teaching or suggestion that polyamide resins can suffer from poor compatibility with phosphazene flame retardants, and also does not teach or suggest a solution to the issue of poor compatibility, such as the presently-claimed use of a phosphazene compatibility enhancing resin or anti-bleed-out resin in *specified amounts* relative to the amount of the phosphazene compound. Therefore, "the manipulation of the constituents", in an amount effective to prevent bleed-out of phosphazene flame retardant, as required by the pending claims), could not have been within the skill of an artisan. The Examiner appears to be using the teachings of the present specification to construct an impermissible hind-sight rejection. Applicants request reconsideration and withdrawal of the rejection.

Indeed, as discussed in more detail below (in connection with a new Declaration Under 37 CFR 1.132), one of skill in the art, attempting to use the teachings of Nakacho to make a polyamide-based composition with a phosphazene flame retardant, might

well have found that the teachings of Nakacho result in compositions which suffer from deficiencies such as bleed-out of the phosphazene flame retardant.

As discussed in previous responses dated March 21, 2006, and May 19, 2006 (which are incorporated herein by reference), neither Ida nor An, whether taken singly or in combination, can overcome the deficiencies of Nakacho. The Ida reference contains no teaching or suggestion of the use of phosphazene compounds as flame retardants, and, *a fortiori*, does not contain any teaching of the addition of a phosphazene compatibility enhancing resin (or anti-bleed-out resin) to a fire retardant polyamide composition. Indeed, the Ida reference actually states that "it is completely unclear whether polyamide resins can be used as base resins, not to mention the fact that no information is yet available concerning the mixing ratios of various flame retardants in cases in which such polyamide resins are used as base resins," see, e.g., Ida at Column 2, lines 36-41. The flame retardants disclosed in the Ida reference for use with polyamides do not include phosphazenes. Thus, Ida can be seen as teaching away from the presently-claimed invention.

Similarly, the An reference does not teach or suggest the use of phosphazene compounds as fire retardants, and does not contain any teaching of a composition including a phosphazene compatibility enhancing resin (or anti-bleed-out resin), in the claimed amounts, to a flame retardant polyamide composition.

Therefore, no combination of Nakacho, Ida, and/or An can teach or suggest the subject matter of any of the pending claims. There is simply no teaching in the Ida or An references that (alone or in combination with the other cited references) can bridge the gap between the teachings of Nakacho and the claimed invention, or would lead one of skill in the art to arrive at the claimed invention.

Reconsideration and withdrawal of these rejections is proper and the same is requested.

Claim 16 is rejected under 35 U.S.C. §103(a) as being unpatentable over Nakacho (EP 0945478) in view of Ida (US 6,337,031) or An (US 5,028,347), and further in view of White (US 4,806,602). This rejection is traversed.

White does not overcome the deficiencies of Nakacho in view of Ida and/or An discussed *supra*. As described in previous responses dated March 21, 2006, and May



19, 2006 (which are incorporated herein by reference), the White reference discloses a method to cap a polyphenylene ether; however, there is no description or suggestion of its use in flame retardant resin compositions. There is no teaching or suggestion in White of a fire retardant resin comprising polyamide resin, a phosphazene compound and a phosphazene-compatibility enhancing resin in the amounts required by pending claim 16. There is clearly no teaching or suggestion in White that such a resin could be modified as suggested by the Examiner to achieve the allegedly superior results. One of the ordinary skill in the art would not be motivated to combine Nakacho, Ida and An with White in the manner proposed by the Examiner. The Examiner's assertion that this combination would have been obvious appears to be impermissible hind-sight, using the present specification as a blueprint to reconstruct the claimed invention from the isolated teachings of the prior art. This is improper. See, e.g., *Grain Processing Corp. v. American Maize-Prods. Co.*, 840 F.2d 902, 907, 5 USPQ2d 1788, 1792 (Fed. Cir. 1988).

In view of the discussion presented herein, it is also clear that claims 17-18 are not obvious in view of the cited references (whether taken alone or in combination). Claims 17 and 18 recite specific ranges for the amount of phosphazene compatibility enhancing resin (B) present in the composition of the invention. These claimed ranges are not disclosed, nor are they taught or suggested, by the Nakacho reference nor by any of the remaining references. Applicants respectfully submit that these claims are allowable and such action is requested.

Applicants respectfully contend that the Examiner has not made out a *prima facie* case of obviousness of the claimed invention. None of the prior art references, whether taken alone or in combination, provide a teaching or suggestion of the specific compositions of the pending claims. Reconsideration and withdrawal of the rejections is proper and the same is requested.

#### Unexpected Results

Moreover, even if the Examiner has established a *prima facie* case of obviousness (which Applicants dispute), the claimed invention nevertheless patentably

distinguishes the cited references. As described above and in the subject specification, the claimed compositions provided unexpectedly superior properties compared to previously known compositions. As described in the instant specification and discussed herein, the present compositions are unexpectedly resistant to "bleed-out" of the flame retardant compound and the attendant problems.

(i) In the Response submitted on March 21, 2006, Applicants discussed the teachings of the present specification and also provided additional evidence in support of the unexpectedly beneficial properties of the claimed compositions, in the form of a Declaration of one of the present inventors ("the Declaration"). In the Declaration, Mr. Suzuki described experiments performed to compare the properties of several compositions, including compositions of the present invention. As described in more detail in the Declaration, a composition which included 20 parts of an anti-bleedout or phosphazene compatibility enhancing resin had much less bleed-out of the phosphazene flame retardant than did a composition lacking an anti-bleed-out resin. Moreover, inspection of the test articles showed that the surface of the article made from the composition including an anti-bleed-out resin was glossy and not sticky. In contrast, inspection of the test article lacking an anti-bleed-out phosphazene compatibility enhancing additive showed that the surface of the article was cloudy or dull, and felt sticky to the touch.

The results discussed above demonstrate that compositions including an anti-bleed-out resin or phosphazene compatibility enhancing resin according to the invention have unexpectedly superior properties when compared to compositions lacking an anti-bleed-out resin. As discussed above, none of the cited references (alone or in combination) teaches or suggests that polyamide resins can suffer from poor compatibility with phosphazene flame retardants. The reference also do not teach or suggest a solution to the issue of poor compatibility, such as the presently-claimed use of a phosphazene compatibility enhancing resin or anti-bleed-out resin in *specified amounts* relative to the amount of the phosphazene compound. Thus, the cited references cannot and do not provide any motivation to the skilled artisan to select the presently-claimed elements, in the claimed amounts.

In the Office Action, the Examiner states that "the comparison [of the compositions in the Declaration] is made only in reference to what is claimed with what is claimed less the polyphenylene ether, which is not relevant to the rejection made." Office Action at page 8. Applicants cannot agree with this statement. The Declaration was offered to demonstrate that the invention provides unexpected results. As provided by the MPEP, "[a]ffidavits or declarations . . . containing evidence of criticality or unexpected results . . . must be considered by the examiner in determining the issue of obviousness of claims for patentability under 35 U.S.C. 103." MPEP 716.01(a). Applicants submit that the Declaration, which provides evidence of unexpected results, is clearly relevant to the rejection of the claims under 35 U.S.C. 103.

In the Office Action, the Examiner further states that "One of ordinary skill in the art would have a great expectation of success using the resins as taught by Nakacho *et al.*" Office Action at page 8. This statement is traversed. As discussed above, Nakacho does not describe the problem of incompatibility between a polyamide resin and a phosphazene flame retardant, and Nakacho also does not teach or suggest any solution to this problem. Moreover, as discussed below, one of skill in the art, attempting to use the teachings of Nakacho to make a polyamide-based composition with a phosphazene flame retardant, could find that the teachings of Nakacho, as applied to polyamide-based compositions, result in compositions which suffer from deficiencies such as bleed-out of the phosphazene flame retardant. One of ordinary skill in the art would not have a reasonable expectation of success based on the teachings of Nakacho.

(ii) Furthermore, Applicants now submit the Second Declaration Under 37 CFR 1.132 of M. Suzuki (hereinafter, the "Second Declaration"), in which additional experiments have been performed to demonstrate the unexpected properties of the claimed compositions.

As described in the Second Declaration, additional experiments were carried out to demonstrate the unexpected advantages of the resin materials according to the present invention.

For Experiment 1, a resin composition was prepared in accordance with the description of Example 1 of Nakacho. The resin composition included a phosphazene flame retardant and a 0.2 parts of PTFE in a polycarbonate (PC)/ABS resin mixture (see Table 1 of the Second Declaration for the amounts of the components). (It is noted that the PC, ABS, and PTFE components of Nakacho cannot be definitively identified, so commercially-available PC, ABS, and PTFE were used.) After mixing and extrusion of pellets, the resin was injection molded to produce test specimens.

For Experiment 2, a similar resin composition was prepared, but this composition omitted the PTFE additive.

For Experiment 3, a resin composition was prepared in accordance with the description of Example 56 of Nakacho. The resin composition included a phosphazene flame retardant in a polyamide (Nylon-6) resin base. After mixing and extrusion of pellets, the resin was injection molded to produce test specimens.

For Experiment 4, a resin composition was prepared in accordance with the description of Example 56 of Nakacho as described in Experiment 3 above, except that the composition further included 0.2 parts of PTFE

For Experiment 5, a resin composition was prepared as for Experiment 3, above, except that no PTFE was used, and a modified polyphenylene ether-based (PPE) resin was used as an additive.

For Experiment 6, a resin composition was prepared as for Experiment 5, above, except that PTFE was also included.

The pellets and test specimens were evaluated, with the results shown in Table 1 of the Second Declaration. It can be seen from Table 1 that bleed-out of the phosphazene flame retardant (and resultant mold deposits) was not seen in Experiments 1 and 2, in which a PC/ABS resin base was used, whether in the presence or absence of PTFE. Thus, the problem of phosphazene bleed-out is not observed when this PC/ABS resin base was used, as disclosed in Nakacho.

On the other hand, when the resin base was a polyamide resin (e.g., Nylon-6 in Experiments 3 and 4), the phosphazene compound was seen to cause bleed-out and mold deposits, whether in the presence or absence of PTFE (but without added phosphazene-compatibility enhancing resin). Applicants note that this Experiment was

intended to follow the teachings of the Nakacho reference; the results show that a composition prepared according to the general teachings of Nakacho can suffer from incompatibility problems when polyamide-based resins and phosphazene flame retardants are employed together. There is no indication in the Nakacho reference that such problems may occur.

While Applicants do not know whether the inventors of the Nakacho reference noticed bleed-out and/or mold deposits when performing the experiment described in Nakacho's Example 56, the Nakacho reference does not describe any such observation. It was the observation of the present inventors that polyamide-based resins could suffer from incompatibility with phosphazene flame retardants. This is relevant to the Examiner's statement that that "One of ordinary skill in the art would have a great expectation of success using the resins as taught by Nakacho *et al.*" (Office Action at page 8). One of skill in the art, attempting to use the teachings of Nakacho to make a polyamide-based composition with a phosphazene flame retardant, might well have found that the teachings of Nakacho, as applied to polyamide-based compositions, result in compositions which suffer from deficiencies such as bleed-out of the phosphazene flame retardant. One of ordinary skill in the art would not have a reasonable expectation of success based on the teachings of Nakacho.

Finally, as shown in Table 1, the addition of PPE resin to the polyamide base prevented bleed-out and mold deposits, whether in the presence or absence of PTFE (see Experiments 5 and 6). Thus, the results of Experiments 5 and 6 demonstrate that polyamide resins can be made compatible with phosphazene flame retardants by the addition of a phosphazene-compatibility enhancing resin such as PPE.

This result is not taught or suggested by Nakacho; that is, there is no indication in the Nakacho reference that incompatibility problems with polyamide-based resins and phosphazene flame retardants can be addressed by the addition of a phosphazene-compatibility enhancing resin such as PPE. Based on the teachings of Nakacho, this result is entirely unexpected.

Thus, Applicants contend that the claimed compositions, including the specified amount of anti-bleed-out resin, patentably distinguish over the teachings of the cited references.

Reconsideration and withdrawal of the rejection is proper and the same is requested.

### **Conclusion**

For at least the above reasons, Applicants request reconsideration of the application and an early indication of allowability.

If the Examiner considers that obstacles to allowance still exist, the undersigned invites a telephone call at the number indicated below. As mentioned above, prior to the issuance of any new Office Action rejecting the instant claim(s), Applicants respectfully request that the Examiner grant an interview for the purpose of clarifying any remaining issues.

The undersigned requests any extensions of time necessary for response. Although it is not believed that any additional fees are needed to consider this submission, the Director is hereby authorized to charge our Deposit Account No. 04-1105, under Docket No. 55968 (71360), Customer No. 21874, should any fee be deemed necessary.

Dated: April 9, 2007  
Customer No. 21874

Respectfully submitted,

By           /Mark D. Russett/            
Mark D. Russett, Registration No.: 41,281  
EDWARDS ANGELL PALMER & DODGE LLP  
P.O. Box 55874  
Boston, Massachusetts 02205  
(617) 239-0100  
Attorneys/Agents For Applicant